

What is claimed is:

- 1 1. A target system for use with a position determination system in determining the
2 location of a position on a vehicle, comprising:
3 a target body;
4 one or more target elements disposed on the target body and detectable by the position
5 determination system; and
6 a point definer extending from the target body, the point definer including a point capable
7 of being located adjacent the position on the vehicle,
8 wherein the position determination system determines a location of the target body after
9 detecting the target elements disposed on the target body.
- 1 2. The system according to claim 1, wherein the point on the point definer is at a
2 known location from the target body.
- 1 3. The system according to claim 1, wherein the point is at a distal end of the point
2 definer.
- 1 4. The system according to claim 3, wherein the point is at the vertex of a conical
2 projection at the distal end of the point definer.

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2 5. The system according to claim 1, wherein the point definer includes one or more
joints that enable the point to be positioned at a different location relative to the target body.

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2 6. The system according to claim 5, wherein the one or more joints each allow
rotation of the point in one or more axis relative to the target body.

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1 7. The system according to claim 5, wherein the point definer includes one joint
2 allowing the point one axes of rotation relative to the target body, the point being positionable in
3 any one of three positions.

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1 8. The system according to claim 5, wherein each joint includes a lock to selectively
2 prevent or allow movement of the point relative to the target body.

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1 9. The system according to claim 1, further comprising a trigger for operating the
2 detection of the target system by the position determination system.

1 10. The system according to claim 9, wherein the trigger is positioned on the target
2 body and is remote from the position determination system.

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1 11. The system according to claim 9, wherein the trigger operates the position
2 determination system by selectively changing the detection of one or more of the target elements
3 by the position determination system.

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1 12. The system according to claim 11, wherein the trigger is movable between one of
2 two positions, in a first of the two positions, the trigger conceals the one or more target elements
3 from the position determination system, and in a second of the two positions, the trigger exposes
4 one or more target elements to the position determination system.

1 13. The system according to claim 1, wherein the target elements are positioned on a
2 single line along the body.

1 14. The system according to claim 13, wherein the single line is substantially parallel
2 with a longitudinal axis of the target body.

1 15. The system according to claim 13, further comprising an attachment device to
2 stabilize the position of the target body relative to the vehicle and the point on the point definer
3 relative to the position on the vehicle to be located.

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1 16. The system according to claim 13, wherein the attachment device includes an
2 attachment arm and a connector for detachable connection to the vehicle, the attachment arm
3 being attached to the target body by a first pivot and being attached to the connector by a second
4 pivot.

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1 17. The system according to claim 1, further comprising an attachment device to
2 stabilize the position of the target body relative to the vehicle and the point relative to the
3 position of the vehicle to be located.

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1 18. The system according to claim 17, wherein the attachment device further
2 comprises a receiver to which the point definer is attached and a connector that connects with the
3 vehicle.

1 19. The system according to claim 18, wherein the receiver includes a reference
2 feature that defines the position of the attachment device relative to the point on the point
3 definer.

1 20. The system according to claim 19, wherein the connector defines a positional
2 relationship between the position on the vehicle to be located and the reference feature.

1 21. The system according to claim 18, wherein the receiver defines a cylindrical
2 recess into which a portion of the point definer is inserted.

1 22. The system according to claim 18, wherein the receiver includes a reference
2 feature that defines the position of the connector relative to the point on the point definer.

1 23. The system according to claim 18, wherein the attachment device is adapted to be
2 attached to a strut of the vehicle.

1 24. The system according to claim 23, wherein the reference feature and the receiver
2 prevent movement of the point definer relative to the attachment device in three axes.

1 25. The system according to claim 24, wherein the reference feature is a flat plane
2 bounding a portion of the recess.

1 26. A target system for use with a position determination system in determining the
2 location of a position on a vehicle, comprising:

3 a target body;

4 one or more target elements disposed on the target body and detectable by the position
5 determination system;

6 a trigger positioned on the target body and remote from the position determination
7 system, the trigger operating the position determination system by selectively changing the
8 detection of one or more of the target elements by the position determination system; and
9 a point definer extending from the target body, and the point definer including a point at a
10 distal end of the point definer, the point being capable of being located adjacent the position on
11 the vehicle, and the point being at a known location from the target body,
12 wherein the position determination system determines a location of the target body after
13 detecting the target elements disposed on the target body.

1 27. A target system for use with a position determination system in determining the
2 location of a position on a vehicle, comprising:
3 a target body;
4 one or more target elements detectable by the position determination system and disposed
5 on the target body along a single line, the single line substantially parallel to a longitudinal axis
6 of the target body;
7 a point definer extending from the target body, the point definer including a point capable
8 of being located adjacent the position on the vehicle, the point being at a known location from
9 the target body; and
10 an attachment device for stabilizing the position of the target body relative to the vehicle
11 and the point on the point definer relative to the position on the vehicle to be located, the
12 attachment device including an attachment arm and a connector for detachable connection to the
13 vehicle, the attachment arm being attached to the target body by a first pivot and being attached
14 to the connector by a second pivot,

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15 wherein the position determination system determines a location of the target body after
16 detecting the target elements disposed on the target body.

1 28. A position determination system for determining the location of a position on a
2 vehicle, comprising:
3 a vision imaging system; and
4 a target system including
5 a target body,
6 one or more target elements disposed on the target body and detectable by the
7 position determination system, and
8 a point definer extending from the target body, the point definer including a point
9 capable of being located adjacent the position on the vehicle;
10 wherein the vision imaging system determines a location of the target body after
11 detecting the target elements disposed on the target body.

1 29. The system according to claim 28, wherein the point on the point definer is at a
2 known location from the target body.

1 30. The system according to claim 28, wherein the point is at a distal end of the point
2 definer.

1 31. The system according to claim 30, wherein the point is at the vertex of a conical
2 projection at the distal end of the point definer.

1 32. The system according to claim 28, wherein the point definer includes one or more
2 joints that enable the point to be positioned at a different location relative to the target body.

1 33. The system according to claim 32, wherein the one or more joints each allow
2 rotation of the point in one or more axis relative to the target body.

1 34. The system according to claim 32, wherein the point definer includes one joint
2 allowing the point one axis of rotation relative to the target body, the point being positionable in
3 any one of three positions.

1 35. The system according to claim 32, wherein each joint includes a lock to
2 selectively prevent or allow movement of the point relative to the target body.

1 36. The system according to claim 28, further comprising a trigger for operating the
2 detection of the target system by the vision imaging system.

1 37. The system according to claim 36, wherein the trigger is positioned on the target
2 body and is remote from the vision imaging system.

1 38. The system according to claim 36, wherein the trigger operates the position
2 determination system by selectively changing the detection of one or more of the target elements
3 by the vision imaging system.

1 39. The system according to claim 38, wherein the trigger is movable between first
2 and second positions, and in a first position, the trigger conceals the one or more target elements

3 from the vision imaging system, and in the second position, the trigger exposes the one or more
4 target elements to the vision imaging system.

1 40. The system according to claim 28, wherein the target elements are positioned on a
2 single line along the target body.

1 41. The system according to claim 40, wherein the single line is substantially parallel
2 with a longitudinal axis of the target body.

1 42. The system according to claim 40, further comprising an attachment device to
2 stabilize the position of the target body relative to the vehicle and the point relative to the
3 position of the vehicle to be located.

1 43. The system according to claim 40, wherein the attachment device includes an
2 attachment arm and a connector for detachable connection to the vehicle, the attachment arm
3 being attached to the target body by a first pivot and being attached to the connector by a second
4 pivot.

1 44. The system according to claim 28, further comprising an attachment device to
2 stabilize the position of the target body relative to the vehicle and the point on the point definer
3 relative to the position of the vehicle to be located.

1 45. The system according to claim 44, wherein the attachment device further
2 comprises a receiver to which the point definer is attached and a connector that connects with the
3 vehicle.

1 46. The system according to claim 45, wherein the receiver includes a reference
2 feature that defines the position of the attachment device relative to the point on the point
3 definer.

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2 47. The system according to claim 46, wherein the connector defines a positional
relationship between the position on the vehicle to be located and the reference feature.

1 48. The system according to claim 45, wherein the receiver defines a cylindrical
2 recess into which a portion of the point definer is inserted.

1 49. The system according to claim 45, wherein the attachment device is adapted to be
2 attached to a strut of the vehicle.

1 ~~50. The system according to claim 45, wherein the receiver defines a cylindrical~~
2 ~~recess into which a portion of the point definer is inserted.~~

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2 ~~51. The system according to claim 50, wherein the reference feature and the receiver~~
~~prevent movement of the point definer relative to the attachment device in three axes.~~

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2 52. The system according to claim 51, wherein the reference feature is a flat plane
bounding a portion of the recess.

Sub 2
3 53. A position determination system for determining the location of a position on a
4 vehicle, comprising:
a vision imaging system; and
a target system including

5 a target body;
6 one or more target elements disposed on the target body and detectable by the
7 vision imaging system;
8 a trigger positioned on the target body and remote from the vision determination
9 system, the trigger operating the vision determination system by selectively changing the
10 detection of one or more of the target elements by the vision determination system; and
11 a point definer extending from the target body, and the point definer including a
12 point at a distal end of the point definer, the point being capable of being located adjacent
13 the position on the vehicle, and the point is at a known location from the target body;
14 wherein the vision imaging system determines a location of the target body after
15 detecting the target elements disposed on the target body.

1 54. A position determination system for determining the location of a position on a
2 vehicle, comprising:
3 a vision imaging system; and
4 a target system including
5 a target body;
6 one or more target elements detectable by the vision determination system and
7 disposed on the target body along a single line, the single line being substantially parallel
8 to a longitudinal axis of the body;
9 a point definer extending from the target body, the point definer including a point
10 capable of being located adjacent the position on the vehicle, the point being at a known
11 location from the target body; and

12 an attachment device for stabilizing the position of the target body relative to the
13 vehicle and the point on the point definer relative to the position on the vehicle to be
14 located, the attachment device including an attachment arm and a connector for
15 detachable connection to the vehicle, the attachment arm being attached to the target
16 body by a first pivot and being attached to the connector by a second pivot,
17 wherein the vision imaging system determines a location of the target body after
18 detecting the target elements disposed on the target body.

55. A method of obtaining a location of a position on a vehicle using a position
2 determination system, comprising the steps of:
3 indicating the position with a target system; and
4 imaging the target system with the position determination system to obtain the location,
5 wherein the target system includes:
6 a target body,
7 one or more target elements disposed on the target body and detectable by the
8 position determination system, and
9 a point definer extending from the target body, the point definer including a point
10 capable of being located adjacent the position on the vehicle.

1 56. The method according to claim 55, wherein the point on the point definer is at a
2 known location from the target body.

1 57. The method according to claim 56, wherein the position determination system
2 calculates the location of the target body and interpolates the location of the point from the
3 location of the target body.

1 58. The method according to claim 55, wherein the point is at a distal end of the point
2 definer.

1 59. The method according to claim 58, wherein the point is at the vertex of a conical
2 projection at the distal end of the point definer.

1 60. The method according to claim 55, wherein the point definer includes one or more
2 points and the one or more joints enabling the point to be positioned at a different location
3 relative to the target body.

1 61. The method according to claim 60, wherein point is positionable relative to the
2 target body in a finite number of point positions.

1 62. The method according to claim 61, wherein point is positionable relative to the
2 target body in any one of three point positions.

1 63. The method according to claim 62, wherein the position determination system
2 calculates the location of the target body and interpolates the location of the point from the
3 location of the target body, and the step of imaging the target system includes:
4 interpolating locations of the point for each point position,

5 comparing the interpolated location of the point for each point position to an
6 estimated location of the position on the vehicle, and

7 obtaining the location by choosing the interpolated location closest to the
8 estimated location.

1 64. The method according to claim 55, wherein the target elements are positioned on
2 a single line along the target body.

1 65. The method according to claim 64, wherein the single line is substantially parallel
2 with a longitudinal axis of the target body.

1 66. The method according to claim 64, wherein the target system includes an
2 attachment device to stabilize the position of the target body relative to the vehicle and the point
3 relative to the position of the vehicle to be located.

1 67. The method according to claim 55, further comprising the step of triggering the
2 step of imaging using the target system.

1 68. The method according to claim 67, wherein the triggering selectively changes the
2 detection of one or more of the target elements by the position determination system.

1 69. The method according to claim 68, wherein the triggering selectively conceals or
2 reveals one or more target elements respectively from or to the position determination system.

1 70. The method according to claim 55, further comprising the step of calibrating the
2 target system by determining the positional relationship of the point relative to the target body.

1 71. The method according to claim 70, wherein the step of calibrating the target
2 system includes:

3 positioning the target body of the target system in at least three different locations
4 while fixing the point of the point definer adjacent to the position on the vehicle,
5 determining the location of the target body at each of the at least three different
6 locations, and

7 interpolating the point of the point definer from the at least three different
8 locations of the target body.

1 72. The method according to claim 70, wherein the step of calibrating the target
2 system includes:

3 positioning the target body of the target system in at least three different locations
4 while maintaining the point definer within a calibration fixture,
5 determining the location of the target body at each of the at least three different
6 locations, and

7 interpolating the location of the point relative to the target body from the at least
8 three different locations of the target body.

1 73. The method according to claim 72, wherein the fixture fixes the point of the point
2 definer at a single location during the positioning of the target body.

1 74. A method of obtaining a location of a position on a vehicle using a position
2 determination system, comprising the steps of:

3 indicating the position with a target system;

4 imaging the target system with the position determination system to obtain the location,
5 wherein the target system includes:
6 a target body,
7 one or more target elements disposed on the target body and detectable by the
8 position determination system, and
9 a point definer extending from the target body, the point definer including a point
10 capable of being located adjacent the position on the vehicle;
11 triggering the step of imaging the target system by selectively changing the detection of
12 one or more of the target elements by the position determination system; and
13 calibrating the target system by determining the positional relationship of the point
14 relative to the target body,
15 wherein the position determination system calculates the location of the target body and
16 interpolates the location of the position from the location of the target body and the positional
17 relationship of the point relative to the target body.

1 75. A method of measuring a body tilt angle of a vehicle using a position
2 determination system, comprising the steps of:
3 indicating vehicle definition points on the vehicle with one or more target systems;
4 imaging the one or more target systems to obtain a position for each of the vehicle
5 definition points;
6 defining a body tilt line using the positions of each of the vehicle definition points;
7 defining a reference line; and
8 calculating the body tilt angle between the body tilt line and the reference line.

1 76. The method according to claim 75, wherein the reference line is along the plane
2 defined by the surface upon which the vehicle is supported.

1 77. The method according to claim 75, wherein the reference line is along the plane
2 defined by centers of rotation of wheels of the vehicle.

1 78. The method according to claim 77, wherein the centers of rotation of the wheels
2 are indicated using targets, which are positioned on the wheels and imaged by the position
3 determination system.

1 79. The method according to claim 75, wherein the vehicle definition points includes
2 points found on each side of the vehicle, as split by a vertical plane passing centrally through a
3 length of the vehicle.

1 80. The method according to claim 79, wherein the vehicle definition points of the at
2 least one set of vehicle definition points are selected from identical locations common to both
3 sides of the vehicle.

1 81. The method according to claim 75, wherein the target system includes:
2 a target body;
3 one or more target elements disposed on the target body and detectable by the position
4 determination system; and
5 a point definer extending from the target body, the point definer including a point capable
6 of being located adjacent the vehicle definition point on the vehicle.

1 82. The method according to claim 75, further comprising the step of comparing the
2 calculated body tilt angle to a specified range of body tilt angles.

1 83. A method of measuring a body tilt angle of a vehicle using a position
2 determination system, comprising the steps of:

3 indicating vehicle definition points on the vehicle with one or more target systems, the
4 vehicle definition points including points found on each side of the vehicle, as split by a vertical
5 plane passing centrally through a length of the vehicle, and the target systems each including:

6 a target body,

7 one or more target elements disposed on the target body and detectable by the
8 position determination system, and

9 a point definer extending from the target body, the point definer including a point
10 capable of being located adjacent the vehicle definition point on the vehicle;

11 imaging the one or more target systems to obtain a position for each of the vehicle
12 definition points;

13 defining a body tilt line using the positions of each of the vehicle definition points;

14 defining a reference line;

15 calculating the body tilt angle between the body tilt line and the reference line; and

16 comparing the calculated body tilt angle to a specified range of body tilt angles.

1 84. A method of measuring a perpendicular distance on a vehicle using a position
2 determination system, comprising the steps of:

3 indicating a reference point on the vehicle with a target system;

4 imaging the target system to obtain a position of the reference point;
5 defining a reference plane; and
6 calculating the perpendicular distance between the reference plane and the reference
7 point.

1 85. The method according to claim 84, wherein the reference plane is the plane
2 defined by the surface upon which the vehicle is supported.

1 86. The method according to claim 84, wherein the reference plane is defined using at
2 least three non-collinear points and the at least three points are indicated using the target system.

1 87. The method according to claim 84, wherein the target system includes:
2 a target body;
3 one or more target elements disposed on the target body and detectable by the position
4 determination system; and
5 a point definer extending from the target body, the point definer including a point capable
6 of being located adjacent the reference point on the vehicle.

1 88. The method according to claim 84, wherein the reference plane is defined by
2 centers of rotation of wheels of the vehicle.

1 89. The method according to claim 88, wherein the centers of rotation of the wheels
2 are indicated using targets, which are positioned on the wheels and imaged by the position
3 determination system.

1 90. The method according to claim 84, wherein the target system includes:

2 a target body;
3 one or more target elements disposed on a single line along the target body and detectable
4 by the position determination system; and
5 a point definer extending from the target body, the point definer including a point capable
6 of being located adjacent the vehicle point on the vehicle.

91. The method according to claim 90, wherein the single line is substantially parallel
with a longitudinal axis of the target body.

92. The method according to claim 90, wherein the target system includes an
attachment device to stabilize the position of the target body relative to the vehicle and the point
and the point definer relative to the reference point on the vehicle.

93. The method according to claim 84, wherein the perpendicular distance being
measured is ride height.

94. The method according to claim 84, further comprising the step of comparing the
calculated ride height to a specified range of ride heights.

95. The method according to claim 93, wherein the reference point is located on a
wheel well.

96. A method of measuring ride height on a vehicle using a position determination
system, comprising the steps of:

indicating a reference point on the vehicle with a target system, the target system
including:

5 a target body,
6 one or more target elements detectable by the position determination system and
7 disposed on a single line along the target body, and
8 a point definer extending from the target body, the point definer including a point
9 capable of being located adjacent the vehicle point on the vehicle;
10 imaging the target system to obtain a position of the reference point;
11 defining a reference plane;
12 calculating ride height between the reference plane and the reference point; and
13 comparing the calculated ride height to a specified range of ride heights.

1 97. A method of obtaining a toe curve for a wheel on a vehicle using a position
2 determination system, comprising the steps of:
3 indicating a reference point on the vehicle with a target system;
4 imaging the target system to obtain a position of the reference point;
5 defining a reference plane;
6 obtaining a first toe angle of the wheel;
7 calculating a first perpendicular distance between the reference plane and the reference
8 point, the first toe angle and the first perpendicular distance defining a first data point;
9 changing the first perpendicular distance to a second perpendicular distance;
10 obtaining a second toe angle of the wheel, the second toe angle and the second
11 perpendicular distance defining a second data point; and
12 interpolating a toe curve from at least two data points.

1 98. The method according to claim 97, wherein the reference plane is the plane
2 defined by the surface upon which the vehicle is supported.

1 99. The method according to claim 97, wherein the toe angles are obtained using the
2 position determination system imaging a target positioned on the wheel.

1 100. The method according to claim 97, wherein the reference plane is defined by
2 centers of rotation of wheels of the vehicle.

1 101. The method according to claim 100, wherein the centers of rotation of the wheels
2 are indicated using the targets positioned on the wheels and imaged by the position determination
3 system.

1 102. The method according to claim 97, wherein the target system includes:
2 a target body;
3 one or more target elements detectable by the position determination system and disposed
4 on a single line along the target body; and
5 a point definer extending from the target body, the point definer including a reference
6 point capable of being located adjacent the vehicle point on the vehicle.

1 103. The method according to claim 102, wherein the single line is substantially
2 parallel with a longitudinal axis of the target body.

1 104. The method according to claim 102, wherein the target system includes an
2 attachment device to stabilize the position of the target body relative to the vehicle and the point
3 on the point definer relative to the reference point on the vehicle.

1 105. The method according to claim 97, further comprising the steps of changing the
2 perpendicular distance before obtaining a new perpendicular distance and a new toe angle for the
3 wheel before extrapolating the toe curve, the new toe angle and the new perpendicular distance
4 defining a new data point.

1 106. The method according to claim 97, wherein the second perpendicular distance is
2 obtained by:
3 vertically moving the vehicle relative to the wheel,
4 imaging the target system again to obtain a second reference point, and
5 calculating the second perpendicular distance between the reference plane and the
6 second reference point.

1 107. The method according to claim 97, further comprising the step of comparing the
2 calculated toe curve to a specified range for the toe curve.

1 108. The method according to claim 97, further comprising the step of extrapolating a
2 toe angle from the toe curve for a given perpendicular distance.

1 109. The method according to claim 108, further comprising the step of comparing the
2 extrapolated toe angle to a specified range of toe angles at the given perpendicular distance.

1 110. The method according to claim 97, further comprising the step of extrapolating a
2 perpendicular distance from the toe curve for a given toe angle.

1 111. The method according to claim 110, further comprising the step of comparing the
2 extrapolated perpendicular distance to a specified range of perpendicular distances at the given
3 toe angle.

1 112. The method according to claim 97, wherein the reference point is located on a
2 wheel well.

1 113. A method of obtaining a toe curve for a wheel on a vehicle using a position
2 determination system, comprising the steps of:

3 indicating a reference point on the vehicle with a target system, the target system
4 including:

5 a target body,

6 one or more target elements detectable by the position determination system and
7 disposed on a single line along the target body, the single line being substantially parallel
8 to a longitudinal axis of the target body, and

9 a point definer extending from the target body, the point definer including a point
10 capable of being located adjacent the reference point on the vehicle;

11 imaging the target system to obtain a position of the reference point;

12 defining a reference plane;

13 obtaining a first toe angle of the wheel;

14 calculating a first perpendicular distance between the reference plane and the reference
15 point, the first toe angle and the first perpendicular distance defining a first data point;
16 vertically moving the vehicle relative to the wheel;
17 imaging the target system again to obtain a second reference point;
18 calculating a second perpendicular distance between the reference plane and the second
19 reference point;
20 obtaining a second toe angle of the wheel, the second toe angle and the second
21 perpendicular distance defining a second data point; and
22 interpolating a toe curve from at least two data points,
23 wherein the toe angles are obtained using the position determination system imaging a
24 target positioned on the wheel.

1 114. A method of measuring alignment of a body of a vehicle relative to wheels of the
2 vehicle using a position determination system, comprising the steps of:
3 indicating a plurality of body definition points on the vehicle with a target system;
4 imaging the target system to obtain positions of the body definition points;
5 calculating a body center line from the positions of the body definition points;
6 obtaining a wheel center line; and
7 calculating a body alignment angle between the body center line and the wheel center
8 line.

1 115. The method according to claim 114, wherein the step of obtaining the wheel
2 center line includes:

3 indicating the centers of rotation of the wheels using targets, which are positioned on the
4 wheels, and

5 imaging the targets with the position determination system to obtain positions of the
6 wheels.

116. The method according to claim 115, wherein the step of obtaining the wheel
2 center line further includes:

3 calculating a front center point of a front wheel track extending between the wheel
4 definition points of two front wheels,

5 calculating a rear center point of a rear wheel track extending between the wheel
6 definition points of two rear wheels, and

7 defining the wheel center line as including the front center point and the rear center point.

117. The method according to claim 114, wherein the plurality of body definition
2 points includes two sets of two body definition points.

118. The method according to claim 117, wherein each set of body definition points
2 includes body definition points found on each side of the vehicle, as split by a vertical plane
3 passing centrally through a length of the vehicle.

119. The method according to claim 118, wherein the body definition points of each
2 set of body definition points are selected from identical locations common to both sides of the
3 vehicle.

1 120. The method according to claim 117, wherein the two sets of body definition
2 points includes a front set substantially adjacent to a front of the vehicle and a second set
3 substantially adjacent to a rear of the vehicle.

1 121. The method according to claim 120, wherein the step of obtaining the body center
2 line further includes:

3 calculating a front body center point of a front body line extending between the body
4 definition points of the front set,

5 calculating a rear body center point of a rear body line extending between the body
6 definition points of the rear set, and

7 defining the body center line as including the front body center point and the rear body
8 center point.

1 122. The method according to claim 114, wherein the target system includes:

2 a target body;

3 one or more target elements detectable by the position determination system and disposed
4 on a single line along the target body; and

5 a point definer extending from the target body, the point definer including a reference
6 point capable of being located adjacent the body definition point on the vehicle.

1 123. The method according to claim 114, further comprising the step of comparing the
2 calculated body alignment angle to a specified range for the body alignment angle.

1 124. A method of measuring alignment of a body of a vehicle relative to wheels of the
2 vehicle using a position determination system, comprising the steps of:
3 indicating two sets of two body definition points on the vehicle with a target system, each
4 set of body definition points including body definition points found on each side of the vehicle,
5 as split by a vertical plane passing centrally through a length of the vehicle, and the two sets of
6 body definition points includes a front set substantially adjacent to a front of the vehicle and a
7 second set substantially adjacent to a rear of the vehicle, each target system including:
8 a target body,
9 one or more target elements detectable by the position determination system and
10 disposed on the target body, the single line being substantially parallel to a longitudinal
11 axis of the target body, and
12 a point definer extending from the target body, the point definer including a point
13 capable of being located adjacent the reference point on the vehicle;
14 imaging the target system to obtain positions of the body definition points;
15 calculating a body center line from the positions of the body definition points;
16 obtaining a wheel center line;
17 calculating a body alignment angle between the body center line and the wheel center
18 line; and
19 comparing the calculated body alignment angle to a specified range for the body
20 alignment angle.